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(NE)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	LABARGE ET AL.)	
)	Group Art Unit: 1754
Serial No.:	09/805,682)	
)	
Filed:	March 13, 2001)	
)	Examiner: E. Johnson
For:	ALKALINE EARTH / RARE EARTH)	
	LEAN NO _x CATALYST)	

RESPONSE

Via Facsimile to 703-872-9311, TC Group 1700 After Final
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

This response is submitted in response to the Final Rejection dated November 6, 2002. Reconsideration and allowance of the case is requested based upon the following remarks

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I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Delphi Technologies.

II. STATUS OF THE CLAIMS

Claims 1, 4-16, 19, 20, 24-29 and 31 are pending in the present application. Claims 1, 4-14, 19, 20, 24 and 31 have been rejected, while Claims 15 and 25 - 29 have been allowed.

III. SUMMARY OF THE PRESENT APPLICATION

The present application relates to a catalyst for purifying gases. The control of NO_x emissions from vehicles is a worldwide environmental problem. Lean-burn, high air-to-fuel ratio, and diesel engines are certain to become more important in meeting the mandated fuel economy requirements of next-generation vehicles, thereby enhancing the need for an effective and durable catalyst for controlling NO_x emissions under net oxidizing conditions. Various alternatives for controlling NO_x emissions have been investigated, such as the use of catalysts that selectively reduce NO_x in the presence of a co-reductant, e.g., selective catalytic reduction (SCR) using ammonia or urea as a co-reductant. Unfortunately, just solving the problem of catalyst activity in an oxygen-rich environment is not enough for practical applications. Like most heterogeneous catalytic processes, the SCR process is susceptible to chemical and/or thermal deactivation. Many lean- NO_x catalysts are too susceptible to high temperatures, water vapor and sulfur poisoning (from SO_x).

A leading catalytic technology for removal of NO_x from lean-burn engine exhausts involves NO_x storage reduction catalysis, commonly called the "lean- NO_x trap". The lean- NO_x trap technology can involve the catalytic oxidation of NO to NO_2 by catalytic metal components effective for such oxidation, such as precious metals. The lean- NO_x -trap technology, however, has been limited to use for low sulfur fuels because catalysts that are active for converting NO to NO_2 are also active in converting SO_2 to SO_3 . Lean NO_x trap catalysts have shown serious deactivation in the presence of SO_x because, under oxygen-rich conditions, SO_x adsorbs more strongly on NO_2 adsorption

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sites than NO₂, and the adsorbed SO_x does not desorb altogether even under fuel-rich conditions.

To address the problems associated with NO_x reduction in exhaust gases, a catalyst for treating an exhaust gas stream was developed, disclosed, and claimed. This catalyst is a NO_x occluding catalyst structure comprising an alkaline earth exchanged zeolite and having an outer layer comprising at least about 50 weight percent of an alkaline earth component, and not more than about 42 weight percent of a rare earth component. Also disclosed and claimed is a catalyst for treating an exhaust gas stream comprising: a NO_x occluding catalyst structure comprising an alkaline earth exchanged zeolite and an alkaline earth alumina having an outer layer comprising at least about 50 wt% of an alkaline earth oxide component, not more than about 42 wt% of a rare earth oxide component, a surface area stabilizer, and a ceramic oxide binder.

IV. ISSUES

1. WHETHER U.S. PATENT NO. 5,051,392 TO MABILON ET AL. ANTICIPATES CLAIMS 1, 5 - 14, 16, AND 31 UNDER 35 U.S.C. §102(b).
2. WHETHER U.S. PATENT NO. 4,988,660 TO CAMPBELL, IN VIEW OF U.S. PATENT NO. 5,053,372 TO BROWNSCOMBE OR IN VIEW OF U.S. PATENT NO. 4,929,338 TO WORMSBECHER, RENDERS CLAIMS 1, 4, 16, 19, 20, 24, AND 31. OBVIOUS.
3. WHETHER U.S. PATENT NO. 5,545,604 TO DEMMEL, RENDERS CLAIM 24 OBVIOUS.

V. ARGUMENT

1. Claims 1, 5 - 14, 16, and 31 Are Patentable Under 35 U.S.C. §102(b) Over Mabilon et al.

As stated in prior responses, the rejection is based upon the position that "at least about 50 wt%" includes a range of "0.1 to about 35 wt%". In response to the Applicants' previous arguments, the Examiner has continued to assert that it is not considered unreasonable for one skilled in the art to interpret the claimed range of "at least about

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50%" as incorporating at least some of the values encompassed by the prior art range of "0.1 to about 35%" (Paper 13, pages 8-9). Applicants have disagreed on the basis that the subject of the present claims and the cited art is catalysts. It is well recognized that the art of catalysis is highly unpredictable, and that even small changes in composition can have unexpected effects. "The unpredictability of catalytic phenomena has been recognized... [A] successfully catalyzed process depends not only on the particular catalyst that may be employed but also on the environment within which the catalysis is accomplished..." *In re Mercier*, 515 F.2d 1161, 185 U.S.P.Q. 774, 779-80 (C.C.P.A. 1975).

Because of the inherent unpredictability associated with catalysts, one of ordinary skill in the catalytic art know that relative terms such as "about" are not reasonably accorded a scope that would result in overlap of the values encompassed by "0.1 to about 35%" and "at least about 50%". This is particularly so where the reference discloses a range that ends at 35% - it is clear that in disclosing a range of "0.1 to about 35%", the reference considers that the 35% is a maximum, and that the values should be less than that maximum. The present claims, on the other hand, are directed to a minimum of about 50%. One of ordinary skill in the art would not, and would have no reason to, stretch the minimum of about 50% so far as to encompass less than about 35%.

The Examiner has stated no basis for the assertion that "[I]t is not considered unreasonable" for one skilled in the art to consider the subject ranges to be overlapping. Applicants continue to be of the opinion, that it would in fact be unreasonable, particularly based on the nature of the catalytic art. Essentially, to go from the 35% of Mabilon et al. to the 50% of the present claims, an artisan would need to expand the Mabilon et al. range by greater than 40%; an unreasonable amount.

The Examiner further notes that "the prior art ingredients are the same..." (Paper 13, page 10). It is noted that the catalyst claimed in the present application comprises a difference in ingredients that is even recognized by one of the references of record. Claim 1 is directed to an alkaline earth exchanged zeolite. Mere deposition is not the same as ion exchange. Wormsbecher, specifically states that "In order to obtain the maximum degree of metals tolerance while avoiding undue deactivation of a zeolite

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component..., the zeolite containing catalyst is added in a form that *does not ion exchange with the zeolite component.*" (Col. 4, lines 55 - 64)

In other words, some of the ingredients of Mabilon et al. and the present application may be the same, but the amounts and the resulting products are different. It is not reasonable to assume that one of ordinary skill in the art would read 0.1 to about 35% to be expanded by more than 40% to include at least about 50%, and there is no teaching in Mabilon et al. to the an alkaline earth exchanged zeolite.

To anticipate a claim under 35 U.S.C. §102, a single source must contain all of the elements of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988). Since Mabilon et al. fail to teach the claimed ranges and fails to teach an alkaline earth exchanged zeolite as is taught an claimed in the present application, Mabilon et al. fail to anticipate or to render obvious the present invention. Applicants respectfully request reconsideration and withdrawal of the rejection over Mabilon et al.

2. Claims 1, 4, 16, 19, 20, 24, and 31 are non-obvious over Campbell in view of Brownscombe or Wormsbecher.

The Examiner relies upon Campbell to disclose catalyst comprising neodymium and calcium and ranges. The Examiner admits that Campbell fails to disclose an alkaline earth exchanged zeolite. Firstly, Applicants continue to disagree with the Examiner's view of the ranges and the position regarding perovskites, as has been set forth in the prior rejections. These remarks are maintained again here and reconsideration and withdrawal of the rejection based upon those remarks is requested..

In addition to the difference in the ranges, as admitted by the Examiner, Campbell fails to disclose an alkaline earth exchanged zeolite. Consequently, Brownscombe is relied upon to disclose an alkaline earth exchanged zeolite. The Examiner contends that the motivation to combine is "because Brownscombe discloses his alkaline earth exchanged zeolite as a shape selective catalyst... and as supports for catalytic components..." (Paper 13, page 4)

Brownscombe and Wormsbecher are separately relied upon to teach an alkaline earth exchanged zeolite. Brownscombe is directed to "Basic Alkaline Earth Metal-

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Zeolite Compositions" having specific compositions; namely any metal ion exchanged into the zeolite is in excess of that required to provide a fully metal cation-exchanged zeolite." (Abstract)

Wormsbecher is directed to a "Catalyst Cracking Catalyst and Process".

Wormsbecher actually teaches away from an alkaline earth exchanged zeolite. "In order to obtain the maximum degree of metals tolerance while avoiding undue deactivation of a zeolite component.... the alkaline earth metal component is added to the zeolite containing catalyst in a form that *does not* ion exchange with the zeolite component." (Col. 4, lines 58 – 63) In other words, Wormsbecher does not want an alkaline earth exchanged zeolite due to zeolite deactivation.

Campbell discloses "[a]lkali metal doped double perovskites containing manganese and at least one of cobalt, iron and nickel are useful in the oxidative coupling of alkane to higher hydrocarbons." Campbell does not mention zeolites.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing that all elements of the invention are disclosed in the prior art; that the prior art relied upon contains some suggestion or incentive that would have motivated the skilled artisan to modify a reference or combined references; and that the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970); *Amgen v. Chugai Pharmaceuticals Co.*, 927 U.S.P.Q.2d, 1016, 1023 (Fed. Cir. 1996).

The Examiner suggests adding the zeolite of Brownscombe to the perovskite of Campbell because Brownscombe generally states that "[i]t is an object of the present invention to provide alkaline earth metal-zeolite compositions... useful as supports..." (Col. 2, lines 25 – 30). However, a mere statement that a material is intended to be useful as a support does not provide the necessary motivation and expectation of success to render the present application obvious. There is no motivation, particularly in the catalysis arts that an alkaline earth metal-exchanged zeolite is a proper support for an alkali metal doped double perovskite. Various materials cannot merely be mixed because one is labeled a support. These are different materials that may react or otherwise effect

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the catalytic activity of the perovskite. Campbell does not list zeolites as potential supports useful with the perovskites.

An Examiner cannot establish obviousness by locating references that describe various aspects of a patent applicant's invention without also providing evidence of the motivating force that would have impelled one skilled in the art to do what the patent applicant has done. *Ex parte Levengood*, 28 U.S.P.Q. 1300 (Bd. Pat. App. Int. 1993). The references, when viewed by themselves and not in retrospect, must suggest the invention. *In Re Skoll*, 187 U.S.P.Q. 481 (C.C.P.A. 1975). When viewed by themselves, without the motivation of the present application, there is no motivation to combine Campbell and Brownscombe as suggested by the Examiner. At least for the reason that there is no motivation to combine, Campbell and Brownscombe fail to render the present claims obvious.

With respect to the combination of Wormsbecher and Campbell as suggested by the Examiner, Wormsbecher specifically teaches away from such a combination. In applying Section 103, the U.S. Court of Appeals for the Federal Circuit has consistently held that one must consider both the invention and the prior art "as a whole", not from improper hindsight gained from consideration of the claimed invention. See, *Interconnect Planning Corp. v. Feil*, 227 U.S.P.Q. 543, 551 (Fed. Cir. 1985) and cases cited therein. According to the *Interconnect* court

[n]ot only must the claimed invention as a whole be evaluated, but so also must the references as a whole, so that their teachings are applied in the context of their significance to a technician at the time - a technician without our knowledge of the solution. *Id.*

When read as a whole, Wormsbecher specifically teaches away from forming an alkaline earth exchanged zeolite. Consequently, when reading the references as a whole, an artisan cannot be motivated to combine Campbell with the an alkaline earth exchanged zeolite of Wormsbecher, because Wormsbecher does not have an alkaline earth exchanged zeolite. Additionally, there is not teaching, suggestion, or expectation of success with the combination of the composition of Wormsbecher with the perovskite of Campbell. Consequently, Wormsbecher and Campbell, alone and in combination also

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fail to render the present application obvious. Reconsideration and withdrawal of these rejections are requested.

3. Claim 24 is non-obvious in view of Demmel.

Claim 24 of the present application is directed to a NO_x occluding catalyst structure comprising an alkaline earth exchanged zeolite and an alkaline earth alumina and having an outer layer comprising an alkaline earth oxide component, a rare earth oxide component, a surface area stabilizer, and a ceramic oxide binder.

The Examiner contends that Demmel discloses a catalyst comprising 50 – 95% calcium oxide in the final product, alumina as a binder, and 40% alumina, wherein alumina also serves as support of the other materials. (Paper 10, page 5) Demmel, however, does not teach a structure comprising “an alkaline earth exchanged zeolite and an alkaline earth alumina”, or an outer layer comprising “an alkaline earth oxide component, a rare earth oxide component, a surface area stabilizer, and a ceramic oxide binder” disposed on that structure.

To anticipate a claim, a reference must disclose each and every element of the claim. *Lewmar Marine*, 3 U.S.P.Q.2d 1766. The Examiner contends that because Demmel discloses an alkaline earth impregnated zeolite that the use of an alkaline earth exchanged zeolite would have been obvious. Firstly, there is no teaching to use an alkaline earth exchanged zeolite and therefore at least one element of the present claims is not disclosed in Demmel. Second, based upon the teaching of Wormsbecher against an alkaline earth exchanged zeolite, it clearly would not have been obvious to use an alkaline earth exchanged zeolite as contended by the Examiner. This contention is unsupported and even contrary to the teachings of another reference of record. Consequently, Demmel fails to render obvious the present claims. Reconsideration and withdrawal of this rejection is requested.

VI. ALLOWED CLAIMS

Claims 15 and 25 – 29 have been allowed. It is noted that Claim 15 is not limited to an ammonium aluminum oxide sol binder. Claim 15 is patentable because the prior art fails to teach a catalyst for treating an exhaust gas stream comprising a NO_x

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occluding catalyst structure having an outer layer comprising an alkaline earth component a rare earth component and a binder wherein the binder is selected from the group consisting of acidic aluminum oxide sol, alkaline aluminum oxide sol, ammonium aluminum oxide sol, and mixtures thereof, and is present in an amount of at least about 2 wt%, and less than about 6 wt%.

VII. CONCLUSION:

In view of the foregoing, it is urged that the final Rejection of Claims 1, 4 - 14, 19, 20, 24, and 31 be reconsidered and withdrawn.

If there are any additional charges with respect to this Response, please charge them to Deposit Account No. 50-0831 maintained by Applicants' attorneys.

Respectfully submitted,

CANTOR COLBURN LLP
Applicants' AttorneysBy: 

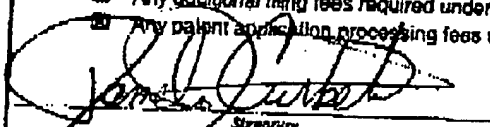

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CERTIFICATE OF TRANSMISSION BY FACSIMILE (37 CFR 1.8)			Docket No. DP-302561
Applicant(s): LABARGE ET AL.			
Serial No. 09/805,682	Filing Date March 13, 2001	Examiner E. Johnson	Group Art Unit 1754
Invention: ALKALINE EARTH / RARE EARTH LEAN NOX CATALYST			
<p>I hereby certify that this <u>Amendment Transmittal Letter (1 page); Amendment (9 pages)</u> (Identify type of correspondence)</p> <p>is being facsimile transmitted to the United States Patent and Trademark Office (Fax. No. <u>703-872-9311</u>)</p> <p>on <u>January 6, 2003</u> (Date)</p> <p><u>Rebecca L. Blake</u> (Typed or Printed Name of Person Signing Certificate)</p> <p><u>Rebecca L. Blake</u> (Signature)</p>			
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AMENDMENT TRANSMITTAL LETTER (Large Entity)				Docket No.	
Applicant(s): LABARGE ET AL				DP-302561	
Serial No. 09/805,652	Filing Date 03/13/2001	Examiner R. Johnson	Group Art Unit 1754		
Invention: ALKALINE EARTH / RARE EARTH LEAN NOX CATALYST					
<u>TO THE ASSISTANT COMMISSIONER FOR PATENTS:</u>					
Transmitted herewith is an amendment in the above-identified application. The fee has been calculated and is transmitted as shown below.					
CLAIMS AS AMENDED					
	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST # PREV. PAID FOR	NUMBER EXTRA CLAIMS PRESENT	RATE	ADDITIONAL FEE
TOTAL CLAIMS			0 x	\$18.00	\$0.00
INDEP. CLAIMS			0 x	\$84.00	\$0.00
Multiple Dependent Claims (check if applicable) <input type="checkbox"/>					\$0.00
TOTAL ADDITIONAL FEE FOR THIS AMENDMENT					\$0.00
<p><input checked="" type="checkbox"/> No additional fee is required for amendment.</p> <p><input type="checkbox"/> Please charge Deposit Account No. _____ in the amount of _____ A duplicate copy of this sheet is enclosed.</p> <p><input type="checkbox"/> A check in the amount of _____ to cover the filing fee is enclosed.</p> <p><input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 50-0831. A duplicate copy of this sheet is enclosed.</p> <p><input checked="" type="checkbox"/> Any additional filing fees required under 37 C.F.R. 1.18.</p> <p><input checked="" type="checkbox"/> Any patent application processing fees under 37 CFR 1.17.</p>					
Signature 			Dated: January 6, 2003		
Pamela J. Curbelo Registration No. 34,676 Cantor Colburn LLP 55 Griffin Road South Bloomfield, CT 06002			<div style="border: 1px solid black; padding: 5px;"><p>I certify that this document and fee is being deposited on 1/6/2003 with the U.S. Postal Service as first class mail under 37 C.F.R. 1.8 and is addressed to the Assistant Commissioner for Patents, Washington, D.C. 20231.</p><p style="text-align: center;"></p><p style="text-align: center;">Signature of Person Mailing Correspondence</p><p style="text-align: center;">VIA FACSIMILE Rebecca L. Blake</p><p style="text-align: center;">Typed or Printed Name of Person Mailing Correspondence</p></div>		

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